MITSUBISHI MITSUBISHI MATERIALS TOOLS NEWS 2013.11 Update B184G

Drill for CFRP machining

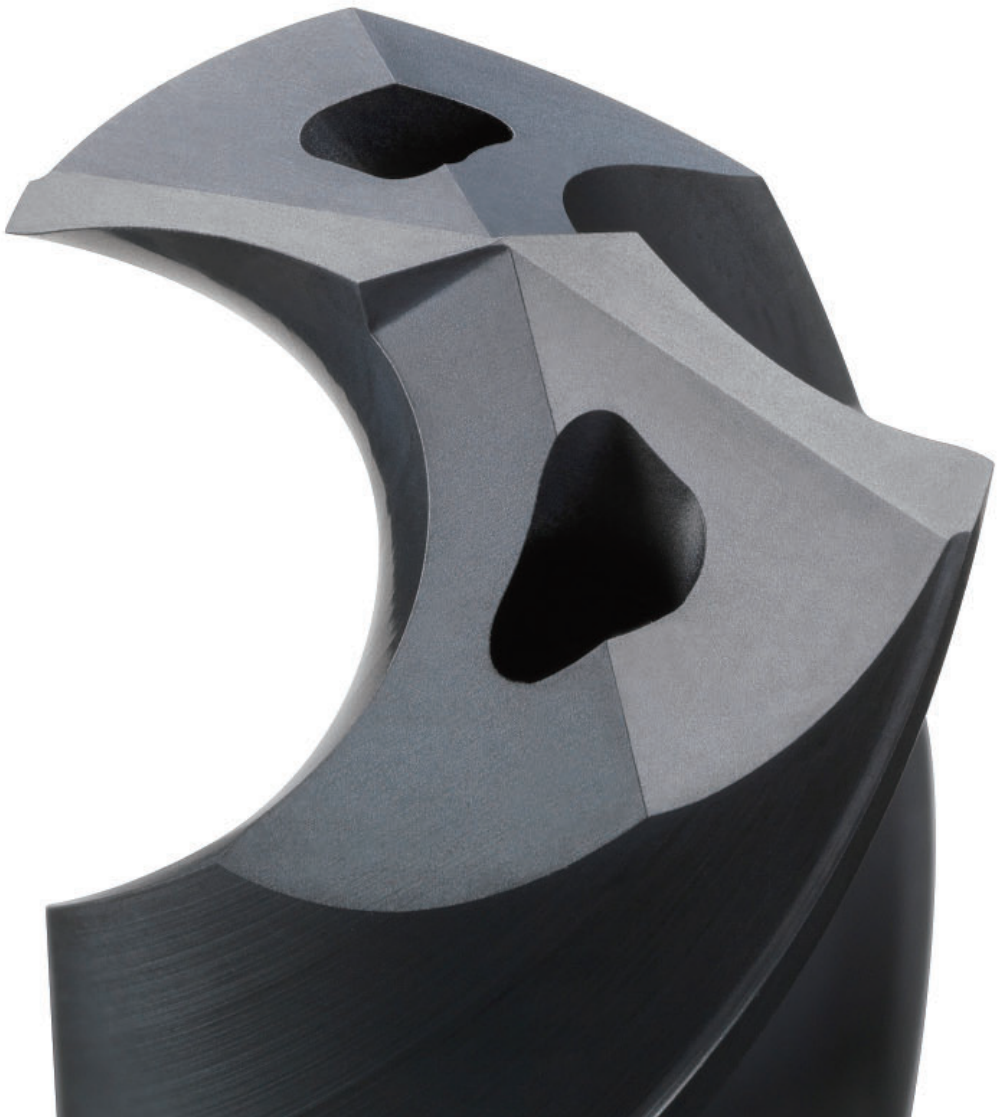
WSTAR Drill Series

MCS

WSTAR series drill for CFRP machining

High quality drilled holes in CFRP.

- The low resistance wavy cutting edge reduces delamination and burrs when drilling CFRP and CFRP/aluminium, CFRP/titanium stacks.
- **TRI Cooling technology®** (PAT.P) is an original coolant hole shape that improves chip removal when machining CFRP/aluminium, CFRP/titanium stacks and achieves highly accurate holes.
- Eight sizes from .1719 inch (4.366mm) to .5010 inch (12.725mm).



Superior sharpness for high quality CFRP drilling.

WSTAR drill series
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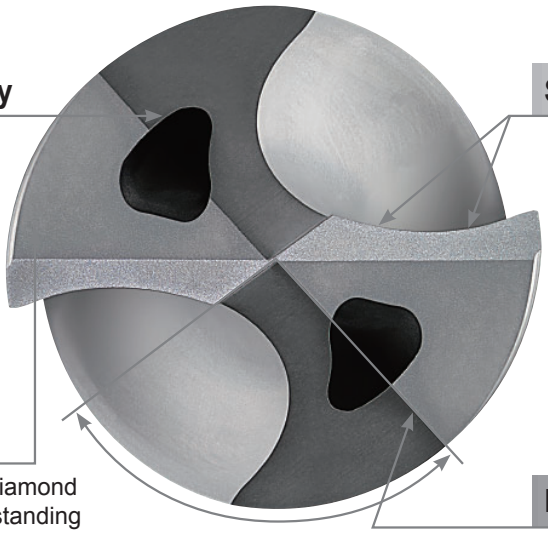


Unique coolant hole geometry

TRI Cooling technology (PAT.P) based on a new concept improves chip removal when machining CFRP/ aluminium, CFRP/titanium stacks. (Coolant holes with TRI Cooling technology on drills larger than ϕ6mm)

Special wavy cutting edge

The low resistance and extremely sharp wavy cutting edge reduces burrs with CFRP, CFRP/aluminium stacks and CFRP/titanium stacks.

New tool grade DD2010

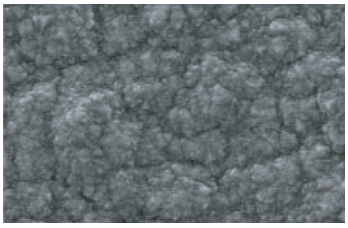
The newly developed DD2010 CVD diamond coated carbide material achieves outstanding abrasion resistance and smoothness, with proprietary fine multilayer diamond crystal control technology.
Note) Uncoated carbide grade TF15 is recommended for CFRP/titanium stacks.

Back clearance

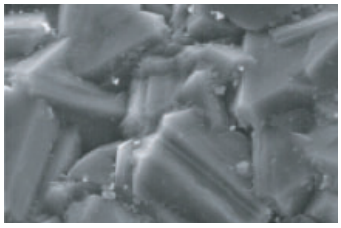
Large back clearance for smooth ejection of chips from the centre.

Proprietary CVD diamond coating

■CVD diamond coating surface comparison

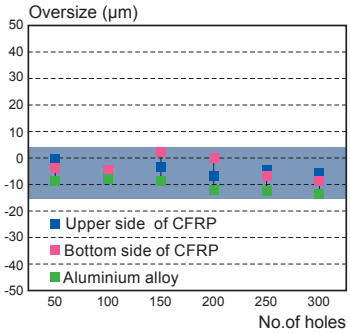


DD2010

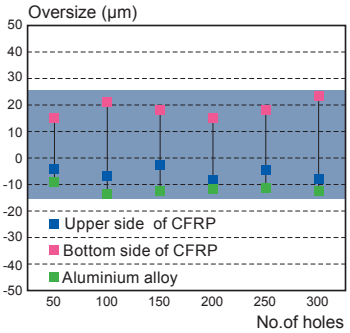


Conventional

An original coolant hole shape



MCS (DD2010)



Conventional

With TRI Cooling technology, the MCS drill improves hole accuracy compared with earlier types.

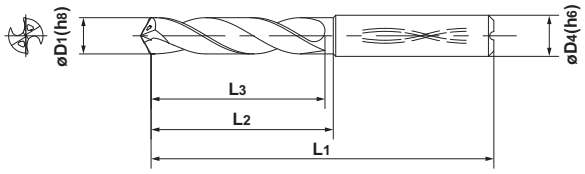
Work material : CFRP/Aluminium stacks
Drill : ϕ6.375mm
Thickness : 13mm (CFRP) + 5mm (Aluminium alloy)
Machine : Machining centre
Cutting speed : vc60m/min (n2,997min^{-1})
Feed : f0.03mm/rev
Internal air brow

Drill for CFRP machining

MCS

Recommended grade		
CFRP	CFRP/Aluminium stacks	CFRP/Titanium stacks
DD2010	DD2010	TF15

	3<D≤6	6<D≤10	10<D≤18	18<D≤20
D1 Tolerance (mm)	0 −0.018	0 −0.022	0 −0.027	0 −0.033
D4 Tolerance (mm)	0 −0.008	0 −0.009	0 −0.011	0 −0.013



(Note) MCS drills are suitable for use with shrink fit holders.

● : Inventory maintained.

Drill Dia. D1 (inch)	Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DD2010	Stock TF15	Order Number	Dimensions (mm) Flute Length L3	Neck Length L2	Overall Length L1	Shank Dia. D4
.1719	4.366	3	Int.	●		MCS01719X3DB	23	28	65	6
.1915	4.864	3	Int.	●		01915X3DB	27	28	65	6
.2510	6.375	3	Int.	●		02510X3DB	33	41	78	8
.3125	7.938	3	Int.	●		03125X3DB	40	41	78	8
.3760	9.550	3	Int.	●		03760X3DB	45	46	87	10
.3765	9.563	3	Int.	●		03765X3DB	45	46	87	10
.4380	11.125	3	Int.	●		04380X3DB	53	54	100	12
.5010	12.725	3	Int.	●		05010X3DB	58	59	105	14

For non stocked sizes please enter details into the □ below.
Please contact us for details of any geometry that is not mentioned.
*Recommended carbide grade TF15 for CFRP/titanium stacks.

Order number of straight type

MC□ □□□□ X□D □□□

- MC□: Coolant — S : Int., E : Ext.
- □□□□: Drill Dia. ϕD1 — Size range : 0300-2000
- X□D: Hole Depth (l/d) — Size range : 2-5
- □□□: Shank Dia. ϕD4 — Size range : 030-200

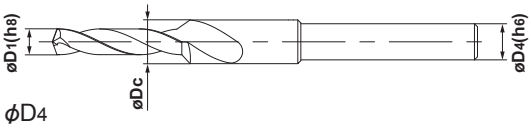
*Minimum diameter with internal coolant is ϕ4mm (ϕ.1575").

Size range of drill dia. : ϕ3mm-ϕ20mm
Size range of shank dia. : ϕ3mm -ϕ20mm
For cutting dia D1 - Please indicate with 4 digits
E.g. ϕ3mm - 0300
For shank dia D4 - Please use 3 digits
E.g. ϕ12mm - 120
*For inch sizes please convert to metric
(1"= 25.4mm)

Order number of stepped type

MC□ □□□□ X□□□□ X□D □□□

- MC□: Coolant — S : Int., E : Ext.
- □□□□: Drill Dia. ϕD1 — Size range : 0300-2000
- X□□□□: Stepped Drill Dia. øDc
- X□D: Hole Depth (l/d) — Size range : 2-5
- □□□: Shank Dia. ϕD4 — Size range : 030-200



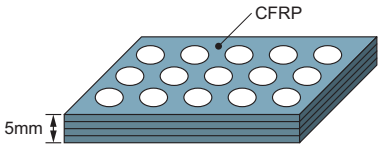
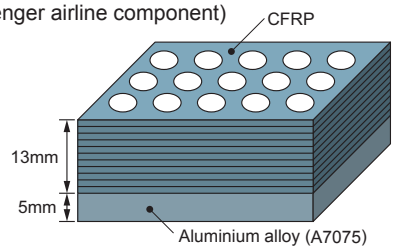
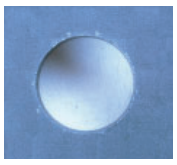
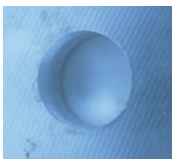
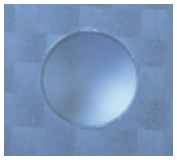
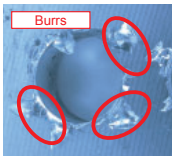
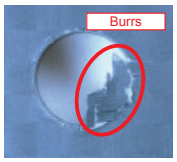
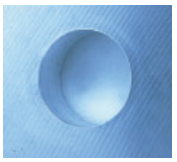
*Minimum diameter with internal coolant is ϕ4mm (ϕ.1575").

RECOMMENDED CUTTING CONDITIONS

Work material	CFRP		CFRP/Aluminium stacks		CFRP/Titanium (Ti-6Al-4V etc.) stacks	
Grade	DD2010				TF15	
Dia. D1 (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
3≤D1<5	85 (50−120)	0.04 (0.03−0.08)	55 (40−70)	0.04 (0.03−0.06)	8 (4−12)	0.03 (0.02−0.04)
5≤D1<8	95 (60−130)	0.05 (0.03−0.10)	65 (50−80)	0.05 (0.03−0.07)	8 (4−12)	0.03 (0.02−0.04)
8≤D1<11	95 (60−130)	0.07 (0.04−0.12)	65 (50−80)	0.06 (0.04−0.08)	10 (5−15)	0.04 (0.03−0.05)
11≤D1≤20	100 (60−150)	0.10 (0.05−0.15)	70 (50−100)	0.07 (0.05−0.10)	10 (5−15)	0.04 (0.03−0.05)

1) Cutting condtions shown left are for when using internal coolant. (mist or air)
2) When drilling CFRP/aluminium stacks with external coolant reduce the cutting conditions by 30%.

CUTTING PERFORMANCE

Drill Diameter		ϕ6.375mm		ϕ6.375mm	
Work Material		CFRP (Passenger airline component) 		CFRP/Aluminium stacks (Passenger airline component) 	
Cutting Conditions	Spindle Speed (min^{-1})	4995		4995	
	Cutting Speed (m/min)	100		100	
	Feed (mm/rev)	0.04		0.04	
Coolant		Air blow		Air blow	
Machine		Machining centre		Machining centre	
Results		Bottom side of CFRP		Bottom side of aluminium alloy	
	MCS (DD2010)			MCS (DD2010)	
	Conventional Drill A for CFRP			Conventional Drill A for CFRP	
	Conventional Drill B for CFRP or aluminium alloy			Conventional Drill B for CFRP or aluminium alloy	
		Earlier types of drills produced large burrs but with the MCS(DD2010) drill burrs are vastly reduced.			

For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or spanner. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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